MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	Kim Smith 7510 Applegate Helena, MT 59602
Permit No.:	MTX000176
Receiving Water:	Class I Ground Water
Facility Information	
Name:	Applegate Meadows
Mailing Address:	West Lincoln Road Helena, MT 59602
Contact:	Kim Smith
Phone:	406-449-4045
Fee Information	
Number of Outfalls:	1
Outfall - Type:	001a - Subsurface Drainfield 001b - Subsurface Drainfield

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I. Permit Status

This is a new permit for a proposed wastewater treatment system as part of a new subdivision in Helena, MT. The proposed subdivision is located southeast of the intersection of West Lincoln Road and Applegate Drive. The Department received the permit application and supporting documents on March 17, 2006. The application was determined to be deficient March 28, 2006. The Department received a response to the deficiency letter and a complete permit application on August 7, 2006 and the permit application was deemed complete.

II.Facility Information

A. Facility Description

The proposed Applegate Meadows (AM) will consist of 68 single-family homes. The AM wastewater treatment system will contain gravity effluent mains that will transport wastewater from each residence to a centralized recirculating sand filter, and drainfield. The centralized wastewater treatment system will consist of sixty eight (68) 1,000 gallon septic tanks one (1) 30,000 gallon recirculation tank, two (2) 2,500 square foot recirculating sand filters two(2) 3,400 gallon dose tanks, and two (2) 19,500 square foot pressure dosed drainfields. The wastewater treatment system will consist of two recirculating sand filters, each measuring 52'x 48' and two (2) pressure dosed drainfield zones, each measuring 136'x 285'.

Effluent from each septic tank will be conveyed via six (6) inch gravity sewer mains to one (1) 30,000 gallon recirculation tank. Wastewater will then be conveyed to two (2) 2,500 square foot, multi-zoned recirculating sand filter via two (2) inch PVC mains. After treatment in the sand filter, wastewater will be returned to the recirculation tank via a four (4) inch PVC main. From this point wastewater flow will be split and either returned to the recirculation tank or diverted to two (2) 3,400 gallon dose tanks. Flow will be split at a 4:1 ratio, returning 80% of the effluent to the recirculation tank and transferring 20 % to the dose tanks. From this point the effluent will be pumped to two (2) hydraulically separate, multi-zoned pressure dosed subsurface drainfields. Each drainfield will be capable of receiving one half the daily design flow (10,000gpd). The wastewater treatment system will discharge every month of the year. The wastewater treatment system will have the capacity to discharge a daily maximum of 20,000 gpd (design capacity) to the groundwater.

The proposed permit authorizes discharge of residential strength wastewater to two (2) subsurface drainfields, which will then discharge to ground water. The drainfields are cross gradient hydraulically, and on the north side of the proposed subdivision. The discharge points from the dose tank are identified as Outfall 001a and 001b. The "zone 1A, 2A, 3A and 4A" drainfield (the western most) will be identified as outfall 001a. The "zone 1B, 2B, 3B and 4B" drainfield (the eastern most) will be identified as Outfall 001b. These outfalls will be located approximately 1.0"- 2.0" below the ground surface. Outfalls 001a and 001b are located at N 46.703, 618 3^{o} latitude and W 112.040, 072,8^{o} longitude situated in T11N, R3W, northwest quarter of Section 19.

B. Effluent Characteristics

The wastewater treatment system is new therefore no effluent samples have been collected or analyzed. The effluent that is discharged from a typical recirculating sand filter system to the drainfield is expected to have the following average chemical characteristics:

- Total Nitrogen (sum of nitrate, nitrite and ammonia and organic nitrogen as N) 10-50 mg/L (EPA, 2002)
- Total Phosphorus: 10.6 mg/L (DEQ, 1997)
- Biological Oxygen Demand (BOD): 2-15 mg/L (EPA, 2002)
- Total Suspended Solids (TSS): 5-20 mg/L (EPA, 2002)

- Bacteria (Escherichia Coli): $10^1 – 10^3$ organisms (EPA, 2002)

III. Proposed Technology Based Effluent Limits

A level II system must provide at least a 60 % removal of total nitrogen in the raw wastewater or produce effluent with a total nitrogen concentration of 24 mg/L or less [ARM 17.30.702 (11)]. The proposed system meets the definition of level II treatment (Regensburger 2004) Attachment II. The Department will use 24 mg/l as an effluent limit because of the inability to get reliable estimates of 60 percent removal of total nitrogen from a wastewater treatment system incorporating multiple septic tanks. The 60 percent removal rate would have to be calculated for the entire treatment system. This would include the primary treatment (each individual septic tank) portion of the treatment system. A sampling and analysis plan for determining a 60 percent removal rate was not outlined in the permit application, therefore a value of 24 mg/L will be used. Because an additional 7% of nitrogen removal is assumed to occur within the drainfield a proposed limit of 26 mg/L will be used. The technology-based permit limit for total nitrogen will be set at 26 mg/L (see Table 1).

The proposed technology based effluent limits for outfall 001a and 001b are presented in Table 1.

Table 1. Technology Based Effluent Limit for Outfall 001a and 001b

Parameter	Concentration (mg/L) Daily Maximum (1)
Total Nitrogen as N	26

(1) See definitions, Part I.A of the permit

IV. Water-Quality Based Effluent Limits

A. Receiving Water

The receiving water for outfalls 001a and 001b is ground water. According to the USGS, the Helena Valley alluvial aquifer system is the sole source of domestic water supply for about 13,000 residents (USGS http://water.usgs.gov/wid/html/mt.html). This aquifer is an unconfined alluvial system (Madison and Briar 1992). The principal water-bearing zone varies across the site. Static water levels of wells in the vicinity reported by the Ground Water Information Center (GWIC) indicate static water levels between 52.0 and 82.0 (GWIC wells 197414,147302, and 165811). The “Drainfield Area” well indicated a static water level in ground water of 50 ft. This well is located in the proposed drainfield area.

The estimated hydraulic conductivity (K) of the aquifer is 615ft/day. This estimate was derived from a drawdown well test conducted in the “7510 Applegate Drive” well (completed upgradient of the proposed discharge, in the shallowest aquifer). Aquifer tests were conducted by Water Right Solutions Inc. (WRS) on March 29, 2005. WRS determined hydraulic gradient and groundwater flow direction to be 0.002 ft/ft and S36°E respectively. WRS used three wells that are within one quarter of a mile of the site to make these determinations. This includes Well #1, Well#2 and Well #3 all of which are located immediately upgradient of the proposed discharge on the Kim Smith property.

The permittee submitted ground water analytical data from seven wells (7275 Applegate Drive, 7510 Applegate Drive, 390 Lincoln Road, Drainfield area well, Corner of Lincoln Road , the Greenway well and the Guettler well). The May 17, 2006 and June 21, 2006 sampling events are depicted in table 2. The average Nitrate + Nitrite as N concentration for the above mentioned wells and sampling dates is 0.94 mg/L.

Table 2. Ground Water Monitoring Results or the Receiving Water

Well Identification	Date Samples	Nitrate + Nitrite (mg/L)	Conductivity (umhos/cm)
7275 Applegate	May 17, 2006	0.91	861
7510 Applegate	May 17, 2006	0.69	689
390 Lincoln Road	May 17, 2006	0.63	735
Drainfield Area Well	May 17, 2006	0.38	321
Corner of Lincoln & Applegate	May 17, 2006	0.77	860
Greenway- Lincoln Road	May 17, 2006	0.58	326
Guettler	May 17, 2006	1.36	791
7275 Applegate	March 29, 2005	1.33	NS
7510 Applegate	June 21, 2006	1.82	NS

The May 17 sampling event yielded specific conductivity values of 861, 689, 735, 321, 860 326 and 791 umho/cm. Therefore, the receiving water for Outfall 001 is Class I ground water as defined by the Administrative Rules of Montana [ARM 17.30.1006 (1)(a)]. Class I ground water is to be maintained for the following beneficial uses with little or no treatment: public and private water supplies, culinary and food processing purposes, irrigation, drinking water for livestock and wildlife and for industrial and commercial uses. Human health standards (DEQ-7, February 2006) apply to concentrations of substances in Class I ground waters (water with specific conductance equal to or less than 1,000 microSiemens/cm). Class I ground waters are considered high quality waters and are subject to Montana's Nondegradation Policy [75-5-303, Montana Code Annotated (MCA)].

Soil profiles indicated the following soil types: Sandy clay loam, Sand and Loamy sand. Three test pits were dug on site. These pits revealed soils that range from Sandy clay loam in the first two feet to Sand and Loamy sand below that. These findings agree with the National Resources Conservation Service (NRCS) Non-Technical Descriptions of soil types expected to be found on site. The NRCS indicates that between 0 and 6 inches the soils are gravely loam, between 6 and 17 inches very gravelly sandy loam to extremely gravelly sandy loam and between 17 and 60 inches very gravelly loamy sand, very gravelly sand and extremely gravely sand.

Based on proximity, the nearest surface water is the Helena Valley Irrigation Canal located approximately 200 ft down gradient of the drainfields. Based on supplemental application information submitted to the Department the Helena Valley Irrigation Canal is a losing system. The Canal is an unlined system that is perched above grade, and above the alluvium of the Helena Valley Aquifer. It is expected that this canal leaches water to the groundwater at a depth of approximately 50 ft. The next closest surface water to the drainfields is Silver Creek, approximately 7,392 ft south and down gradient of the proposed discharge. This value will be

used to determine nonsignificancant changes in water quality with a phosphorous breakthrough calculation

B. Basis for Water Quality based Effluent Limits

The Montana Water Quality Act states that it is unlawful to cause pollution, as defined in 75-5-103, of any state waters, to place or cause to be placed any wastes where they will cause pollution of any state waters.

Water quality limitations must be established in permits to control all pollutant or pollutant parameters that are or may be discharged at a level which will cause, an excursion from any state water quality standard. The permittee must comply with Montana Numeric Water Quality Standards included in Circular DEQ-7 (February 2006) and protection of beneficial uses (ARM 17.30.1006). Ground water quality standards may be exceeded within a Department authorized mixing zone, provided that all existing and future beneficial uses of state waters are protected (ARM 17.30.1005).

C. Nitrate

Class I ground water is considered high quality water and is subject to Montana's Nondegradation Policy 17.30.705. The proposed wastewater system is considered a new source as pursuant to ARM 17.30.702 (18)(a). The applicable ground water standard, a nitrate concentration of 7.5 mg/L at the end of the proposed standard mixing zone is based on nondegradation rules [ARM 17.30.715 (1)(d)(iii)].

Total nitrogen is the sum of inorganic nitrogen and organic nitrogen concentration (nitrate + nitrite as N (NO_3+NO_2-N) plus ammonia and organic nitrogen as N). The Department assumes all the nitrogen discharged to the drainfield in the effluent is converted to nitrate as nitrogen. The allowable discharge concentration is derived from the mass balance water quality equation, which considers dilution and background concentration of the receiving water (EPA, 2000). Due to the size and orientation of the drainfields (Attachment 1) with respect to ground water flow, the department is considering both drainfields as one for the purpose of calculating nitrogen and phosphorus limits.

$$C_2 = \frac{C_3 (Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_1= ambient ground water (background) concentration, mg/L
C_2 = allowable discharge concentration, mg/*L*
C_3 = ground water concentration limit for pollutant (from Circular DEQ-7 or other appropriate water quality standard) at the end of the mixing zone.
Q_1 = ground water volume (ft^3 / day)
Q_2 = maximum flow of discharge (design capacity of system in ft^3 / day)

The volume of ground water that will mix with the discharge (Q_1) is estimated using Darcy's equation: $Q_1 = K\ I\ A$.

Where: Q_1 = ground water flow volume (ft^3/day)
K = hydraulic conductivity (ft/day)
I = hydraulic gradient (ft/ft)
A = cross-sectional area (ft^2) of flow at the down-gradient boundary of a standard 500-foot mixing zone.

$$(Q) = (615\ ft/day)(0.002 ft/ft)(11{,}662.5 ft^2)$$
$$Q = 14{,}345\ ft^3/day$$

The design capacity of the entire wastewater disposal system is 20,000 gpd, or 2,674 ft^3/day. Hydraulic conductivity (K) of the alluvium is estimated at 615 feet per day (ft/d). The gradient was calculated based on well data from wells surrounding the site, at 0.002 ft/ft. The area (A) is calculated by the width of the source perpendicular to the ground water flow direction, times a mixing zone depth in the groundwater of 15 feet. The applicable water quality standard of 7.5 mg/L must be met at the end of the mixing zone. The average nitrate concentration in the receiving water was calculated as 0.94 mg/L. Therefore an ambient concentration of nitrate-nitrogen of 0.94 was used in calculating the allowable nitrogen concentration at the end of the mixing zone. It is assumed that the entire total nitrogen load in the seepage effluent converts to nitrate and enters the ground water.

$$C = \frac{7.5\ mg/L\ (14{,}345 ft^3/day + 2{,}674 ft^3/day) - (0.94\ mg/L)\ (14{,}345 ft^3/day)}{(2{,}674 ft^3/day)}$$

$$= 42.7\ mg/L$$

The projected daily maximum concentration of the total nitrogen in the effluent discharged to groundwater must not exceed 42.7 mg/L at Outfalls 001a and 001b. As stated in Section III, 7% nitrogen removal is assumed to occur within the drainfield providing a final total nitrogen concentration discharged to ground water of 45.7 mg/L. These effluent limits ensure the nitrate plus nitrite (as N) concentration at the end of the ground water mixing zones are at or below the nondegradation significance criterion of 7.5 mg/L.

D. Phosphorus

Phosphorus is removed mainly through soil sorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the average load of phosphorus from the wastewater source, between the discharge point and the closest downgradient surface water. The total phosphorus limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water [ARM 17.30.715(1)(e)]. The effluent limits do not include a concentration limit for phosphorus because of the method used to determine compliance with the 50-year breakthrough criteria. Phosphorous breakthrough analysis calculations are mass based, therefore the limit will be a load based discharge limit.

The phosphorus concentration of typical residential wastewater ranges from 6.0 mg/L to 12.0 mg/L (EPA 2002). The Department considers 10.6 mg/L an average concentration of typical residential wastewater (DEQ-Taskforce 1997). The estimated load from the drainfield based on this average is approximately 1.76 lbs per day or 645.3 lbs/year.

Conducting a phosphorous breakthrough analysis of each drain field is a less conservative means of calculating the effects of phosphorous to state waters. Due to the proximity and similar orientation of the drainfields the Department assumes both drainfields are one for the purpose of calculating phosphorous breakthrough. Using the distance to the receiving surface water (Silver Creek) approximately 7,392 feet southeast and down gradient of the proposed drainfields the breakthrough time for phosphorus is 264 years. This breakthrough time is considered nonsignificant pursuant to Montana's Nondegradation criteria [ARM 17.30.715(1)(e)].

A phosphorous breakthrough would occur in 50 years (the level of significant degradation) at an effluent concentration of 44.96 mg/ L and load of 7.5 lbs/day or 2,750 lbs/year. Therefore the effluent limit for the Total Phosphorous load discharged to the drainfield shall not exceed 7.5 lbs/day or 2,750 lbs/year for Outfall 001a and 001b. The water quality based effluent limit for each outfall will therefore be set at 7.5 lb/day.

E. Escherichia Coli

A wastewater treatment system that is appropriately sited and operating properly should remove most if not all of the pathogenic bacterial indicators within 2 to 3 feet of the drainfields infiltrative surface (USEPA, 2002). An Escherichia coli (E coli) limit has not been established in this permit due to the following site-specific criteria:

- The drainfield is pressured-dosed, which minimizes saturated conditions and therefore maximizes the die-off rate in natural sediments.
- Ground water levels in the immediate area range from more than 50 feet below ground surface to 80 feet below ground surface.
- Estimated concentration of E coli bacteria 10^6-10^8, and SWIS performance for removal of E coli bacteria is estimated to be about 99 % (EPA 2002).
- The permittee will be required to meet ground water quality standards and monitor groundwater at the end of the mixing zone.

The systematic dosing of the drainfield and the soil matrix of the drainfield provide natural disinfection, which will enable the DEQ-7 human health standard of <1 organism/100 ml to be achieved in the groundwater. Pathogen transport research indicates a 3-log decrease in pathogens for every meter of horizontal movement through the vadose zone and a 6-log decrease in pathogen transport for every 20 m in vertical transport through the saturated zone (Woessner, 1998). The proposed system discharges the effluent approximately 16 m above the ground water; additional treatment will occur prior to reaching the water table. A 3-log removal in the vadose zone indicates less than 1 colony per 100 ml within 3-feet of the discharge. No Mixing Zone will be granted for pathogens.

The proposed water quality and nondegradation effluent limits for outfalls 001a and 001b are presented in Table 3.

Table 3. Water-Quality Effluent and Nondegradation Limits for Outfalls 001a and 001b

Parameter	Concentration (mg/L) Daily Maximum (1)	90 Day Average Load (2) (lbs/ per day)
Total Nitrogen as N	40.6	NA
Total Phosphorus as P	NA	7.5

(1) See definitions, Part I.A of the permit

(2) 90 day average load calculation: lb/d = (mg/L) x flow (gpd) x 8.34 x 10^{-6}

F. Mixing Zone

The permittee has proposed to discharge all wastewater from Outfalls 001a and 001b and has requested a standard 500-foot ground water mixing zone for each drainfield in a S36°E direction. The permittee must comply with the ground water mixing zone rules pursuant to ARM 17.30 Subchapter 5. The concentration of pollutants at the downgradient boundary of the proposed standard mixing zone was estimated based on a mass balance calculation. Ground water standards may be exceeded within the mixing zone, provided that all existing and future beneficial uses of the state waters are protected [ARM 17.30.1005].

Groundwater flow direction was established via potentiometric map, developed from data collected from multiple monitoring and domestic wells within 3,000 feet from the proposed discharge site. Ground water flow direction was submitted by Stahly Engineering and Associates Inc. as part of the permit application (2006) and agree with groundwater flow directions reported in USGS Water Resources Investigation Report 92-4023. The shape of the mixing zone is determined from the drainfield dimensions, information on water table elevation and area topography and groundwater flow direction (Stahly, 2006), and was illustrated in supplemental information submitted with the permit application. The dimensions of the wastewater treatment system, the drainfield and its associated mixing zone are illustrated in Attachment 1. The proposed drainfields discharge to ground water and qualify for a standard mixing zone [ARM 17.30.517 (1)(b)].

A ground water mixing zone will be granted for the individual parameter of nitrate [ARM 17.30.505(a)]. The concentration of Nitrate (N) must not exceed 7.5 mg/l on the down gradient boundary of the mixing zone [ARM 17.30.715 (1) (d) (iii). The permittee will be required to comply with the all applicable ground water quality standards [ARM17.30.508(1)(a)][ARM 17.30.1006(1)(a), DEQ-7] at the down-gradient edge of the mixing zone.

V. Final Effluent Limits

The proposed final effluent limitations for Outfall 001a and 001b are summarized in Table 4 and are based on the more restrictive of the technology and water quality criteria discussed in previous sections. The final proposed effluent limit for nitrogen is technology based

The effluent limit for phosphorus is a water quality based nondegradation significance criteria. The water quality based effluent load limit considers the assimilative capacity of the soil system to estimate the maximum load of phosphorus discharged to the groundwater without exceeding

the 50-year breakthrough. The 90 day average loads limit will provide protection for the surface and groundwater.

The permittee submitted technical information indicating a design capacity of 20,000 gpd. The design flow is the peak flow (daily or instantaneous) for sizing hydraulic facilities, such as pumps, piping, storage and adsorption systems and means the average daily flow for sizing other treatment systems. This value is used in calculations for phosphorous load limits and for calculations for determining the allowable nitrogen concentration at the end of the mixing zone. The combined flow limit from outfalls 001a and 001b shall not exceed the design capacity of 20,000 gpd based on the daily average.

Table 4. Final Numeric Effluent Limits for Outfall 001a and 001b

Parameter	**Concentration (mg/L) Daily Maximum (1)**	**90 Day Average Load(2) (lbs/ per day)**
Total Nitrogen as N	26.0	NA
Total Phosphorus as P	NA	7.5(2)

(1) See definitions, Part I.A of the permit
(2) load calculation: lb/d = concentration (mg/L) x flow (gpd) x 8.34 x 10^{-6}
NA = Not Applicable

VI. Monitoring Requirements

Effluent monitoring is essential to ensure the effective treatment and consistency of the wastewater discharged from the facility. The effluent limits are established to protect the ground water from a change in water quality that would cause degradation [ARM 17.30.715] or limit a beneficial use [ARM 17.30.1006(1)(a)]. Samples or measurements shall be representative of the volume and nature of the monitored discharge. Water quality monitoring of the effluent shall occur from the dosing tank prior to discharge into the drainfields. The permittee shall monitor the flow of the effluent continuously and report the gallons per day based on the daily maximum.

The measurement method shall be either by flow meter and recorder or a totalizing flow meter; dose counts or pump run-times will not be accepted. Flow measurement equipment must have the ability to report a daily maximum flow. To ensure that the Total phosphorous load is calculated correctly, an accurate maximum daily flow must be measured. Maximum daily flow shall be measured when required sampling is conducted (flow measurement must correspond to sample collection to calculate an accurate load). The effluent flow rate is to be a measured and reported as a maximum daily flow.

The permittee shall monitor the effluent for the constituents in Table 5 at the frequency and with the type of measurement indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report that no discharge occurred.

Table 5. Outfall 001a and 001b Parameters Monitored in the Effluent Prior to Discharge to the Drainfield

Parameter	Frequency	Sample Type[1]
Effluent Flow Rate, gpd[2] [3]	Daily[1]	Continuous[1]
Biological Oxygen Demand (BOD_5), mg/L	Quarterly[1]	Composite
Total Kjeldahl Nitrogen (TKN), mg/L	Quarterly	Composite
NO_3+NO_2 as N, mg/L	Quarterly	Composite
Ammonia, as N, mg/L	Quarterly	Composite
Total Phosphorus (as P), mg/L	Quarterly	Composite
Total Suspended Solids (TSS) mg/L	Quarterly	Composite
Total Nitrogen (as N), mg/L	Quarterly	Calculated
Total Nitrogen (as N), lb/d	Quarterly	Calculated
Total Phosphorus (as P), lb/d	Quarterly	Calculated

(1) See definitions, Part I.A of the permit
(2) If no discharge occurs during the reporting period, "no discharge" shall be recorded on the DMR report form
(3) Permittee is to report the daily maximum and 90 day average

A. Ground Water Monitoring

Ground water monitoring will be required in this permit due to the following site-specific criteria:

- Presence of two (2) drainfields in close proximity with potential for cumulative effects to state waters.
- This area is experiencing rapid growth with high density development.
- The treatment system is a trickling filter, which does not provide significantly enhanced fecal removal as is obtained with disinfection.
- The need to distinguish the effects on ground water from the wastewater treatment system.

The permittee is required to monitor the ground water on the downgradient edge of the standard 500-foot mixing zones. Based on the site map submitted by the permittee in August, 2005, one monitoring well shall be located on the downgradient edge (southeast side) of the mixing zone and be identified as MW-1. This well shall be located equidistant between the east and west edges of the primary drain fields mixing zones. This well shall serve as compliance monitoring point for the standard groundwater mixing zones. The well, shall be screened from the top of the high water table to 15 feet below the low water table. The permittee will conduct quarterly monitoring for the parameters listed in Table 6. MW-1 shall be installed prior to issuance of the final permit. Ground water monitoring shall commence upon installation of the ground water monitoring well to asses pre discharge ground water quality at the end of the mixing zone.

Table 6. Monitoring Parameters for Monitoring Well: MW-1

Parameter	Frequency	Sample Type (1)
Static Water Level (SWL) (feet below the casing top)	Quarterly	Instantaneous
Specific Conductance, µmhos/cm	Quarterly	Grab
Escherichia Coli (Organisms/100 m*l*)	Quarterly	Grab
NO_3+NO_2 as N	Quarterly	Grab

(1) See definitions, Part I.A of this permit

If monitoring on the downgradient edge of the mixing zone demonstrates that ground water quality standards or nondegradation water quality significance criteria in the receiving ground water are exceeded as a result of the permitted discharge the permittee shall initiate monthly sampling and analysis of MW-1 for a minimum of one year (12 consecutive months) if any of the following occurs:

1. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L within any sample from the compliance monitoring wells located at the boundary of the mixing zone during any regularly scheduled quarterly monitoring event.
2. If NO_3^- + NO_2^- - N is detected in excess of 7.5 mg/L in both the regular quarterly monitoring sample and the required re-sample during 2 consecutive quarterly monitoring periods, or within 50% of the monitoring results within any consecutive 12-month period.

VII. Significance Determination

The Department has determined that the discharge constitutes a new source and is subject to Montana Nondegradation Policy (75-5-303, MCA; M 17.30.702(16)). The Department has determined this discharge is nonsignificant with respect to nitrogen as concentrations at the end of the mixing zone are predicted to be less than 7.5 mg/L (nitrate sensitivity analysis). Phosphorus load limits are based on nondegradation significance criteria for 50-year break-through to surface water in accordance with ARM 17.30.715(1)(e). Therefore, discharge in compliance with the limitations of this permit constitutes nonsignificant degradation.

VIII. Special Conditions

a) Effluent Flow Measurement

Prior to issuance of the final permit, the permittee shall submit to the Department the method of effluent flow monitoring. Effluent flow shall be monitored following treatment in the sand filter and prior to discharge into the drainfield. The measurement method shall be either by recorder or a totalizing flow meter, dose counts or pump run-times will not be accepted. The permittee shall monitor the flow of the effluent continuously.

b) Monitoring Well Installation

Prior to issuance of the final permit, the permittee shall submit to the Department for approval a plan for compliance ground water monitoring well installation as well as a brief summary of a monitoring, sampling and analysis plan for monitoring wells installed onsite. The plan is to include the location, conceptual design and construction methods of the planned ground water monitoring wells, and the monitoring, sampling and analysis methods that will be used to meet the monitoring required in the Permit. The well shall be located in the centerline of the terminus of the Outfall 001a and 001b drainfields at the end of the mixing zone.

Prior to discharge the permittee shall submit to the Department a brief report or letter documenting the results of the monitoring well installation including the final location of the installed monitoring well, construction details for the well and a report on ground water quality in the from the well. Ground water quality analysis shall include those parameters listed in Table 6. Ground water quality monitoring shall begin upon installation of the well (prior to commencement of discharge) and continue though the duration of the permit.

IX. Information Source

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002

Department of Environmental Quality, DEQ Taskforce (1997), Meeting Minutes-Efficiency of Level II systems.

Department of Environmental Quality, Nitrate Sensitivity Analysis Input Data, DEQ summary paper, September 1, 1994

Environmental Protection Agency, U.S. EPA NPDES Permit Writers Manual, December 1996

Environmental Protection Agency, Design Manual: Onsite Wastewater Treatment System Manual. EPA 625/R-00/008, 2002.

Fetter, C.W., Applied Hydrogeology., 1988

Madison, P.J., Briar, W.D., Hydrology of the Helena Valley-Fill Aquifer System, West Central Montana , USGS Water Resources Investigation Report 92-4023, 92p. 1992

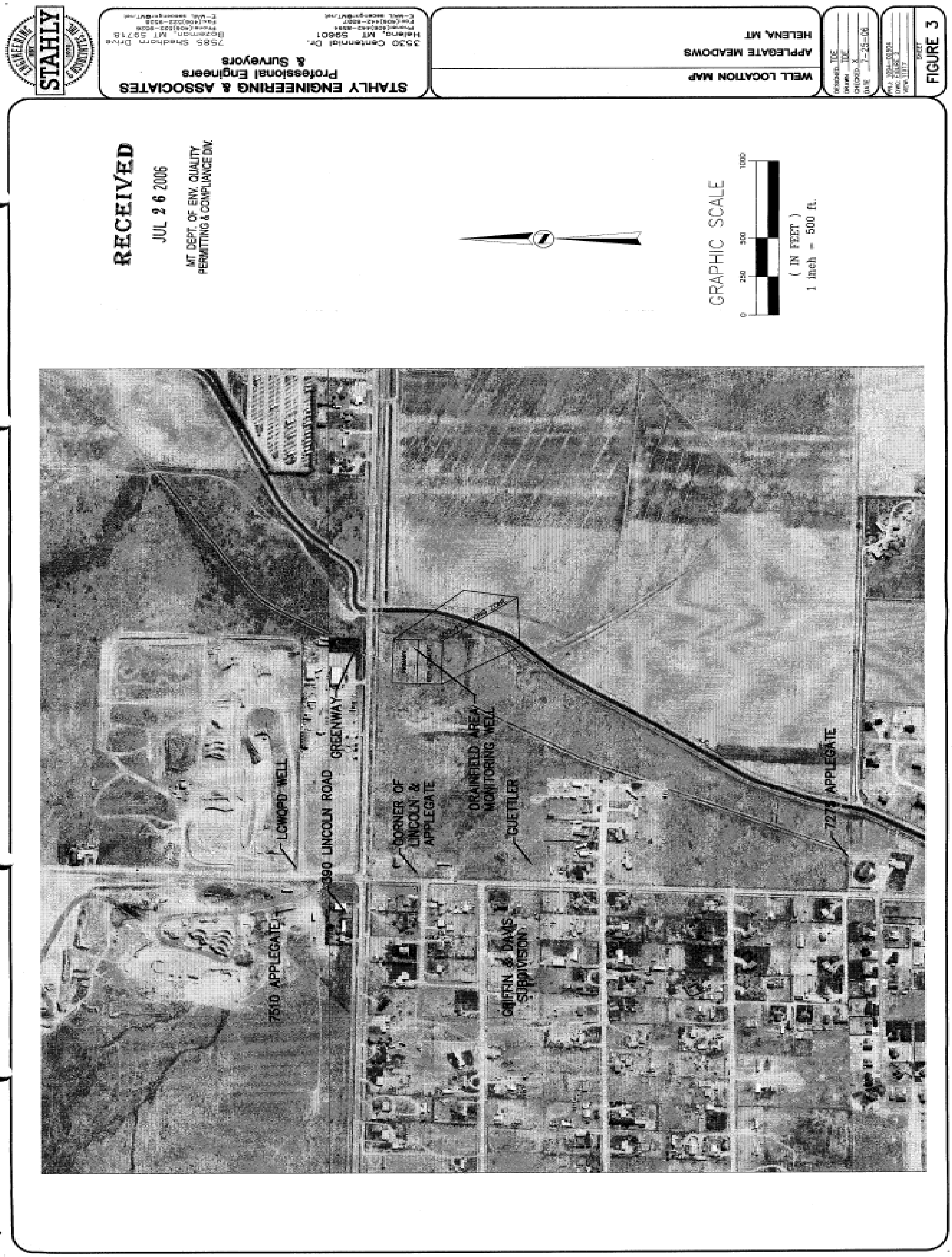
Regensburger, E. Nutrient-Reducing Wastewater Treatment System Designation Form. Montana Department of Environmental Quality. 2004

Sthaly Engineering & Associates Inc., MGWPCS permit application, March 2006

Woessner, W., Thomas, Troy., Ball, Pat and DeBorde, Dan C., (April 1998), Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Flow Zone: Challenges to Natural Disinfection. , University of Montana., Missoula, Montana

Prepared By: Louis Volpe September 14, 2006

Attachment I


STAHLY
STAHLY ENGINEERING & ASSOCIATES
Professional Engineers
& Surveyors
3530 Centennial Dr.
Helena, MT 59601
7585 Shedhorn Drive
Bozeman, MT 59718
WELL LOCATION MAP
APPLEGATE MEADOWS
HELENA MT
FIGURE 3
RECEIVED
JUL 26 2006
MT DEPT. OF ENV. QUALITY
PERMITTING & COMPLIANCE DIV.
GRAPHIC SCALE
(IN FEET)
1 inch = 500 ft.
LOWORD WELL
390 LINCOLN ROAD
GREENWAY
CORNER OF LINCOLN & APPLEGATE
DRAINFIELD AREA MONITORING WELL
GUETTLER
APPLEGATE
7510 APPLEGATE
GRIFFIN & DAVIS SUBDIVISION